

stress in the coating. Applicant submits that it cannot be obvious to do something (e.g. add additional layers) when the very thing argued to be obvious would result in failure of the underlying device or apparatus. Conventionally, the practical limit for the number of layers that can be added to the coating has been 46, above which the coatings would spall off the substrates due to increased stress. (See specification, page 2 lines 7-14). The Krisl patent discloses a coating structure having 5 additional layers, bringing the total to 51, but it is entirely silent regarding application of additional layers in a manner that overcomes the problem of failure due to increased stress.

The inventors herein devised a way to provide additional refractive layers in an optical interference coating (greater than 51 layers as recited in claim 1) in such a manner that the additional layers do not result in excess stress and mechanical failure which had been the problem in the conventional art.

The invention of claim 1 comprises an interference coating comprising alternating layers of high index of refraction and low index of refraction materials. The ratio of total thickness between the high- and low-index of refraction materials is more strongly determinative of mechanical stress than of optical performance. (See specification, page 5 lines 13-15). Recognizing this relationship, the inventors surprisingly found that "as the value of r [thickness ratio of high- to low-index of refraction materials] is increased for a given number of layers, the mechanical stresses decrease. As a result, for the first time, more than 51 layers can be used in the interference coating without suffering mechanical failure due to tensile stresses." (See specification, page 5 lines 18-23).

Without employing the ratio of high- to low-index of refraction materials disclosed in the application, it would have been impossible to provide, consistently and reproducibly, interference coatings with greater than 51 layers in such a manner as to avoid mechanical failure due to overstressing the coating. The ratio disclosed herein is novel and non-obvious over the prior art. In particular, Krisl et al. do not disclose or suggest such a ratio to permit addition of additional layers over 51 while ensuring mechanical stability of the resulting interference coating.

Krisl et al. do not even recognize the inherent difficulties associated with increased mechanical stress from providing greater than 51 layers of refractive materials in the interference coating. Nor do they provide any motivation for increasing the number of layers. Contrary to the Examiner's position, it would not have been obvious simply to add more layers because, absent the inventive ratio of high- to low-index of refraction materials, such would have resulted in over-stressing the layers causing mechanical failure of the coating.

Krisl et al. neither recognize nor address this problem. Only by appropriately regulating the ratio of high- to low-index of refraction materials can additional layers over 51 be provided reliably and consistently without mechanical failure to an optical interference coating as explained in the specification (see page 5 lines 26-31).

In view of the above, the rejection of claim 1 has been overcome, and claim 1 is now allowable.

New claims 21 and 27 are independent claims, and each recites "a ratio of the total thickness of all of the layers of high index of refraction material to the total thickness of all of the layers of low index of refraction material, r , is greater than 0.76." As discussed above, this ratio is neither disclosed nor suggested in the prior art. Therefore these claims should be allowable.


In view of the above, claims 1, 21 and 27 should be allowable. All remaining claims have already been indicated as being allowed or allowable, or are otherwise dependent on one of the allowable independent claims. Therefore, Applicant submits that all claims are now in condition for allowance, and a notice to that effect is respectfully requested.

Respectfully, the Examiner is reminded that Applicant has not yet received an initialed copy of the 1449 form submitted with the information disclosure statement filed on August 22, 2002. The Applicant respectfully requests the Examiner initial and enclose the subject 1449 form with her next communication to the Applicant. For the Examiner's convenience, a copy of this 1449 form is enclosed herewith.

If there are any fees required by this communication not specifically referred to above, please charge such fees to our Deposit Account No. 16-1820, Order No. 32575.

Respectfully submitted,

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